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5 May 1952

MEMORANDUM FOR: RESEARCH & DEVELOPMENT ADVISORY BOARD

SUBJECT: Field Marking Equipment (RDP-60), Beacon, Field Marking, Infrared (RDP-60A), Night Landing System, Ultraviolet (RDP-60B) - Progress Report and Request for Requirements

1. Problem

- a. To report on the progress of development of Field Marking and Night Landing Systems.
- b. To establish requirements consisting of suggested operational characteristics and numerical quantities.

2. Discussion

a. The Applied Physics Branch, RDD/TSS, is currently pursuing the development of equipment and techniques on the basis of Division requests for the following:

(1) A secure clandestine method for marking a drop zone.

(2) A secure clandestine method for guiding a plane to a landing at night.

b. Beacon, Field Marking, Infrared

(1) On 13 December 1951, the EE Division requested that RDD investigate, test, and produce, on a high-priority basis, a suitable beacon for use by a ground reception committee in pin-pointing, or marking, a drop zone for parachute operations. It was specified that this beacon should incorporate infrared, or some other technique necessary for covert operation, but visible to an aircraft flying up to 10,000 feet and 5 miles from the target.

(2) To satisfy this request, the Applied Physics Branch arranged for a suitable contractor to modify ten Coleman Welsbach mantle-type gasoline lamps with suitable filter, lens, ventilating system, and light traps to produce an infrared beacon which would meet these requirements. Ten prototypes of this beacon are currently on hand.

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(3) This beacon is 16-1/2 inches high and 6-1/2 inches in diameter, weighing about eight pounds when filled with gasoline. In preliminary tests, these beacons functioned well from the ground crew standpoint. They were transported over 200 miles by car and carried about very rough terrain several times with no damage to the mantles. It was demonstrated that before dusk the lamps could be filled, the mantles prepared by being burned off, and six lamps placed in a pattern and lighted by one man in about thirty minutes. It was also shown that, with the mantles burned off, the lamps filled, and using image metasopes for viewing, six lamps could be lighted and placed in a pattern after dusk by two men with no show of visible light. It seems completely reasonable that this could also be accomplished by one man although it would take longer and be more irksome.

(4) In this system, an infrared viewer is required in the plane to see the beacon, and small light viewers are valuable on the ground for placing and retrieving the beacons after dusk. The viewers currently being evaluated are as follows:

(a) Air

- 1 M-2 Snooperscope
- 2 Electronic Viewer US/C3
- 3 Infrared Binoculars
- 4 Image Metascope

(b) Ground

- 1 US/F Metascope
- 2 Image Metascope
- 3 US/AM Metascope

c. Night Landing System, Ultraviolet

(1) On 18 June 1951, RDD was requested by the FE Division to investigate a system which would permit the covert night landing of an aircraft. This problem was assigned to the Applied Physics Branch, RDD, which monitored the Air Force evaluation of such a system. This system consists essentially of an ultraviolet light source in the plane and an autocollimator (fluorescent) on the ground. Ultraviolet light from the plane is collected by the autocollimator which sends back visible light in the same direction from which the ultraviolet

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light came. This system requires no special viewer in the plane and gives the pilot sufficient depth perception to land his plane at night on a field outlined by these markers. The range is approximately one to one and one-half miles.

(2) 127 of these Autocollimators have been obtained by RDD. The ultraviolet source in the plane involves the installation of a BH-6 or AH-8 ultraviolet lamp and associated power equipment in the plane; these lamps are commercially available. A technical expert has been cleared who could install or train a technician to install the lamps and associated power equipment in the plane.

(3) The above system is feasible and practical, as indicated in the preceding paragraphs. If an immediate need exists for a night-landing operation, this system, as is, could be provided. However, since Division requirements currently indicate an existing need for Drop Zone Marking, rather than Night Landing, improvements in this system are being investigated. The designer of the autocollimator was contacted and volunteered the information that this device was developed in a hurry early in World War II for guiding ships into harbors. Further development could make it more compact and more sensitive, thus permitting its use at a greater range. The present stock of autocollimators could probably be reworked to be more sensitive. The designer recommended that infrared rather than ultraviolet be used in such a system. Continued investigation will be made toward the development of a better system unless an immediate pressing need exists.

3. Requirements

It is requested that the Research & Development Advisory Board members investigate the requirements described in the following paragraphs for their Divisions and submit them to RDD/TSS, including priority numbers and target date as pertinent.

a. Beacon, Field Marking, Infrared

- (1) Number of Beacons (six per system);
- (2) Number of Viewers - Air (two per system);
- (3) Number of Viewers - Ground (two per system);
- (4) Suggested additional characteristics.

b. Night Landing

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b. Night Landing System, Ultraviolet

(1) Statement of current or future need for night landing system.

(2) Numbers, priorities, and target date associated with Requirements (1) above.

(3) Suggested additional characteristics



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Acting Chief
Research & Development

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